

SECTION 5 POTENTIAL RISK CALCULATION FOR BIOACCUMULATION

Based on guidance in USEPA (1997; p. 2-4), estimates of potential risk for individual COPCs are generated with HQs comparing receptor-specific EPVs to lowest NOAEL or NOAEL-equivalent TRVs. HQs for composite COPC groupings with similar toxic mechanisms are also addressed with hazard indices (HIs) calculated as the sums of HQs for the appropriate COPCs. Equations for generating HQs and HIs are the following:

$$HQ_{x1} = EPV_{x1}/TRV_{x1}$$

$$HI_{\Sigma x1..xt} = (HQ_{x1} + HQ_{x2} + \dots + HQ_{xt})$$

where:

HQ_{x1} = hazard quotient for COPC x1 for a target receptor (unitless);

EPV_{x1} = exposure point value for COPC x1 for the target receptor;

TRV_{x1} = lowest NOAEL or NOAEL-equivalent TRV for COPC x1 for the particular target receptor type (crustacea, fish, or birds from Tables 3.3.1-1, 3.3.1-2, or 3.3.2-1, respectively); and

$HI_{\Sigma x1..xt}$ = hazard index for the target receptor for the sum of HQs for COPCs x1 through xt where additivity for COPCs is appropriate (unitless).

COPC groupings for which HIs are determined include tLMWPAH, tHMWPAH, tPAH, tDDT, tChlordane, tPCB – TEQ-birds, tPCB – TEQ-fish, tDioxin/Furan, tDioxin/Furan – TEQ-birds, and tDioxin/Furan – TEQ-fish (Section 2.1.2).

As described in USEPA (1997; p. 2-4), HQ and HI values can be interpreted in the following manner.

An HQ less than one (unity) indicates that the contaminant alone is unlikely to cause adverse ecological effects. If multiple contaminants of potential ecological

concern exist at the site, it might be appropriate to sum the HQs for receptors that could be simultaneously exposed to the contaminants that produce effects by the same toxic mechanism. The sum of the HQs is called a hazard index (HI). An HI less than one indicates that the group of contaminants is unlikely to cause adverse ecological effects. An HQ or HI less than one does not indicate the absence of ecological risk; rather, it should be interpreted based on the severity of the effect reported and the magnitude of the calculated quotient.

USEPA (1997; p. 2-4) also notes “The screening-level risk calculation is a conservative estimate to ensure that potential ecological threats are not overlooked.” In the context of these guidelines, estimates for potential bioaccumulation risk for the SRA are based on maximum EPVs (determined with maximum concentrations in wild-caught tissue samples for composite benthic macroinfauna, epibenthic crabs, tilapia, or bandtail goatfish and shallow sediments for incidental sediment ingestion by waterbirds and shorebirds) and lowest NOAEL or NOAEL-equivalent TRVs.